REMARKS

Claim Amendments

Applicant amends claim 15 by inserting --to said materials to provide a stable electrical contact resistance-- after composition, and --in an amount sufficient for promoting adhesion of the adhesive to a substrate-- after promoter. Basis for this amendment is found in the specification as originally filed, for example, on page 3, line 23, and pages 15-16. Applicant believes no new matter is introduced.

Claim 30 is amended to correct matters of form and to delete "is an aliphatic hydrocarbon radical" from the Markush group for R_1 and to replace "consisting of" with --comprises--.

Response To Claim Rejections Under 35 U.S.C. § 103

Claims 15, 16, 18, 30 and 31 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Okuri et al. (U.S. Patent No. 4,943,604), Saito et al. (U.S. Patent No. 5,194,502), Lohse (U.S. Patent No. 3,624,178) and Japanese Patent Nos. 60-206882, 60-235877 and 49-97052 in view of Eadara (U.S. Patent No. 5,198,065), Vincent et al. (1999) Enhancement of Underfill Encapsulants for Flip-Chip Technology. Soldering & Surface Mount Technology 11(3): 33-39; Wang et al. (U.S. Patent No. 5,686,541), and Soviet Union Patent No. 1,628,508. Applicant respectfully traverses this rejection because the references do not teach or suggest all of the claimed elements.

Cited References

Okuri et al. and Saito et al. are cited as teaching urethane modified epoxy resins. Lohse et al. is cited as teaching methylhexahydrophthalic acid anhydride crosslinking agent. The Japanese patent applications are cited as teaching epoxide modified adhesives formed by reacting an isocyanate prepolymer with glycidol. Lohse et al. is cited as teaching isocyanate reacting with monoepoxy alcohol or epoxy resins containing hydroxy groups. The references are also cited as teaching crosslinking agents and conductive fillers. As acknowledged in the Office Action, none of the primary references teach or suggest an adhesion promoter for promoting adhesion of the adhesive to a substrate.

The secondary references, Eadara and Vincent et al., are cited as teaching adhesion promoters. Eadara allegedly teaches an epoxy silane adhesive for providing moisture resistance

to adhesives used to bond steel and wood. Vincent et al. allegedly teaches the addition of epoxy-functional silane to an epoxy underfill system to decrease the viscosity, contact angle, flow time, and increase the adhesion of the epoxy underfill to the filler.

Analysis

With regard to claim 15, Applicant submits that the cited references do not teach or suggest all of the claimed elements because the references fail to teach or suggest an epoxide-modified polyurethane resin having an adhesion promoter in an amount sufficient to promote adhesion of the adhesive to a substrate. The Office Action concedes that Okuri et al. (U.S. Patent No. 4,943,604), Saito et al. (U.S. Patent No. 5,194,502), Lohse (U.S. Patent No. 3,624,178) and Japanese Patent Nos. 60-206882, 60-235877 and 49-97052 do not teach or suggest an epoxide-modified polyurethane resin having an adhesion promoter in an amount sufficient to promote adhesion of the adhesive to a substrate. Vincent et al. and Eadara are cited as curing this deficiency. Applicant respectfully disagrees.

Applicant encloses a Declaration of coinventor Dr. C.P. Wong to establish that Dr. Wong is a co-author of Vincent et al., and that the work described in Vincent et al. is in fact, Dr. Wong's work. The described work was done at the direction and under the control of Dr. Wong in Dr. Wong's laboratories at Georgia Institute of Technology. Dr. Wong alone conceived of the application of organofunctional silanes in conductive adhesives to increase the adhesion of the adhesive to a substrate. Accordingly, Applicant submits that Vincent et al. cannot be used as prior art in the present application.

Eadara teaches urethane-modified epoxy resins including an epoxy silane as an adhesion promoter for providing the cured adhesive with resistance to moisture (col. 2, lines 45-46). The adhesives of Eadara are used for bonding steel to wood. The presently claimed subject matter is directed to electrically conductive adhesives used to connect electrically conductive materials, for example circuit boards. Applicant respectfully submits that one of ordinary skill in the art would not be motivated to combine the teachings of modified epoxy compounds for binding wood to steel with teachings directed to electrically conductive adhesives used to couple electrically conductive materials. Wood is a non-conductive substance. Nothing in the cited references teaches or suggests the use of epoxy silanes to promote adhesion of the adhesive to a substrate. Rather, Eadara teaches the use of epoxy silanes for providing moisture resistance to compositions

for binding wood to steel. The moisture resistance is a result of increased intra-resin adhesion attributable to the adhesion promoter. Eadara is therefore directed to solving a different problem than the subject matter of the present application. Thus, there is no basis to believe that the adhesives of Eadara would be useful for connecting electrically conductive materials, nor that the adhesive promoters of Eadara could be useful in electrically conductive adhesives that adhere to a substrate.

Even if one of ordinary skill in the art would be motivated to combine the teachings of Eadara with the cited primary references, the combination of the references does not result in the claimed subject matter. None of the primary references teach or suggest an adhesive having an amount of an adhesion promoter sufficient for adhering the adhesive to a substrate as claimed in claim 15. Eadara does not cure this deficiency for the reasons presented above. Accordingly, the combination of references cannot render claim 15 obvious.

Claim 16 depends from claim 15 and is not obvious for at least the reasons claim 15 is non-obvious over the cited references.

Claim 18 depends from claim 16, and is non-obvious for at least the reasons provided for claim 16 and claim 1 above.

Claim 30 is amended by deleting "is an aliphatic hydrocarbon radical" from the Markush group defining R_1. Applicant submits none of the cited references, either alone or in combination, teach or suggest the epoxide-modified polyurethane as claimed in amended claim 30. The Japanese patents and Saito et la. ('502) teach an epoxide-modified polyurethane formed by reacting PTMEG with a diisocyanate. PTMEG provides a linear aliphatic portion which corresponds to R_1 in such a reaction. The Japanese patents, or any other cited reference, do not teach or suggest epoxide-modified polyurethanes wherein R_1 is a cycloaliphatic hydrocarbon radical, an aromatic hydrocarbon radical, or an araliphatic hydrocarbon radical. Accordingly, the cited references do not teach or suggest all of the elements of claim 30, and therefore, cannot render claim 30 obvious.

Claim 31 depends from claim 30 and is non-obvious at least for the reasons claim 30 is non-obvious.

Claims 15 and 18 are also rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Wang et al., Japanese Patent No. 50-352232, Soviet Union Patent No.

1,628,508 and Saito et al. Patent No. 4,845,136 in view of Eadara et al. and Vincent et al. Applicant respectfully traverses this rejection because the cited references do not teach or suggest all of the claimed elements.

The Office Action indicates that claims 15 and 18 do not require the structure recited in claims 16 and 30. Applicant notes that claim 18 depends from claim 16, and therefore incorporates all the elements of claim 16 including the recited structure. Therefore, Applicant submits the rejection should be rescinded with respect to claim 18.

Claim 15 is non-obvious over the cited references for the reasons provided above. None of the primary reference teach or suggest an adhesion promoter in an amount sufficient for promoting adhesion of the adhesive to a substrate. Vincent et al. is not a proper reference against the present application, and Eadara does not cure the deficiency in the teachings. Accordingly, Applicant submits the rejection is overcome.

Claims 16, 30, and 31 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Soviet Union Patent No. 1,628,508 in view of Okuri et al., Lohse et al. and Japanese patent '052 because Soviet Union Patent generically discloses oligo urethane diepoxide without disclosing the structure of the specific oligo urethane diepoxides. The Office Action alleges that it would have been obvious to use the compounds of Okuri et al., Lohse et al. , and Japanese patent '052 in combination with the teachings of the Soviet Union Patent to produce the claimed subject matter. Applicant respectfully traverses this rejection because the cited references do not teach or suggest all of the claimed elements.

For example, the compositions in claims 16 and 30 recite an adhesion promoter. Okuri et al., Lohse et al., the Soviet Union Patent, and Japanese patent '052 do not teach or suggest an epoxide-modified urethane having an adhesion promoter. Indeed, none of these references teaches or discloses and adhesion promoter. Moreover, none of these references teach or suggest using a conductive adhesive to establish a stable electrical resistance between electrical conductive materials. Accordingly, Applicant submits the rejections should be withdrawn.

Additionally, claim 30 as amended recites R_1 as a cycloaliphatic hydrocarbon radical, an aromatic hydrocarbon radical, or an araliphatic hydrocarbon radical. None of the cited references, individually or in combination, teach or suggest this element. Therefore, the cited references cannot render claim 30 or its dependent claim 31 obvious.

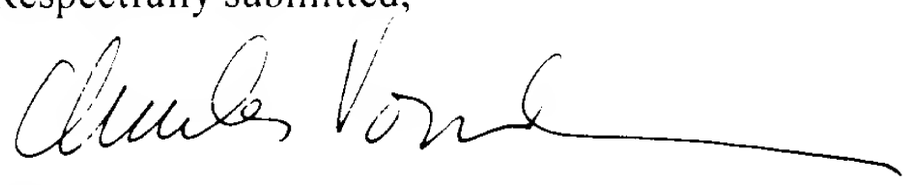
New Claims

Claims 33 and 34 have been newly added to further define and/or clarify the scope of the invention. New claim 33 omits alkoxysilanes as an adhesion promoter. Applicant submits that these dependent claims are allowable for at least the reasons that independent claim 15 is allowable.

CONCLUSION

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims 15 are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

Respectfully submitted,



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